The highest temperature recorded at any station was 93° at San Jacinto on the 16th. This was 1° higher than the highest temperature during February, 1912. The lowest temperature was −14°, which occurred on the 22d at Alturas and Tamarack. This was 4° lower than the lowest temperature of February, 1912.

PRECIPITATION.

The average precipitation for California for February, with departures from the normal, is as follows:

Years.	Mean.	Departure.	Year.	Mean.	Departure.
	Inches.	*Inches.*		*Inches.*	*Inches.*
1897	5.85	+1.44	1906	4.88	+0.47
1898	2.95	−1.46	1907	4.14	− .27
1899	.45	−3.96	1908	3.99	− .42
1900	.94	−3.47	1909	8.00	+3.59
1901	6.03	+1.62	1910	2.43	−1.98
1902	8.14	+3.73	1911	3.33	−1.08
1903	1.76	−2.65	1912	.75	−3.66
1904	7.91	+3.50	1913	2.07	−2.34
1905	4.24	− .17			

The greatest monthly precipitation was 14.20 inches, at Nellie. Four stations reported no rain during the month.

SNOWFALL IN THE MOUNTAINS.

February, 1913, was a month of light snowfall in the Siskiyou, the Coast Range, and the northern portion of the Sierra Nevada. In the Sierra Madre and other ranges of southern California the snow was unusually heavy, and there appears to be ample water for irrigation purposes in the south.

SPECIAL COMPARATIVE REPORTS.

Summit.—The following table shows depth of snow on ground at Summit, Placer County, on several dates in February for a number of years:

Years.	Feb. 1.	Feb. 14.	Feb. 28.
	Inches.	*Inches.*	*Inches.*
1907	137	95	88
1908	88	115	74
1909	172	224	213
1910	76	70	72
1911	228	240	215
1912	38	27	23
1913	85	55	55

SUNSHINE.

The following table gives the total hours of sunshine and percentages of possible:

Stations.	Hours.	Per cent of possible.	Stations.	Hours.	Per cent of possible.
Eureka	176	59	Sacramento	251	83
Fresno	220	73	San Diego	175	57
Los Angeles	179	58	San Francisco	205	68
Mount Tamalpais	220	73	San Jose	210	69
Red Bluff	248	83	San Luis Obispo	153	50

There was more sunshine in the northern part of the State than in February, 1912, and less sunshine in the southern part.

NOTES ON THE RIVERS OF THE SACRAMENTO AND LOWER SAN JOAQUIN WATERSHEDS DURING FEBRUARY, 1913.

By N. R. TAYLOR, Local Forecaster.

Sacramento watershed.—All streams in this watershed fell steadily during the greater part of the month. The main rivers averaged from 5 to 7 feet below the February normal and from 1 foot to over 2 feet below the stages that obtained during the preceding month.

The Sacramento River at all points below Red Bluff was but slightly above the unusually low stages that were recorded during the corresponding month of 1912. From Red Bluff to Kennett the river was the lowest of any previous February of which there is a record.

The American River averaged only 0.5 of a foot above the stage of February, 1912, which is the lowest on record for the month.

The Feather and Yuba Rivers and their tributaries were the lowest of which there is a record for the month, their average stages being comparable with those maintained during the extreme low water period.

There was a marked deficiency in precipitation throughout the drainage basin of the Sacramento Valley. But little snow fell in the high regions of the Sierra Nevada and practically none at all below the 3,500-foot level. The snow already on the ground at the beginning of the month diminished steadily, mostly by evaporation, and without any appreciable effect on the run-off of the mountain streams, many of which were frozen over during the entire month.

The visible water supply is much below that of January 31, and the present outlook is not encouraging.

Lower San Joaquin watershed.—Much less than the usual amount of precipitation occurred in this watershed, and as a result all streams, already low at the beginning of the month, continued to fall steadily, their average stages being much below the February normal.

The Calaveras River and the San Joaquin itself, below Lathrop, were the lowest on record for the month of February.

The visible water supply is below the average.

NOTES ON THE STREAMS OF THE UPPER SAN JOAQUIN WATERSHED.

By W. E. BONNETT, Local Forecaster.

Mean February stages at all points on the streams of the upper San Joaquin watershed were the lowest of record for that month. The Merced was slightly lower than in January, the San Joaquin remained at exactly the January stage, and the Kings was a trifle higher.

February precipitation in the Kings River watershed was slightly in excess of the normal. It is probable that there was some excess over normal February precipitation in the watershed of the main stream, while there was a deficiency farther north in the Merced area. Slight rises at all points, except at Firebaugh, followed the rains of the 23d to 26th, but by the end of the month there was a recession everywhere almost to the low stages which prevailed before the rains.

At Merced Falls the average stage for February was 0.3 foot, as compared with a seven-year average of 0.9 foot. At Friant there was a mean of −0.6 foot; the seven-year average is 0.8 foot. The San Joaquin at Firebaugh was stationary at −0.9, as compared with an average of 3.4

feet for the last seven Februarys at that station. At Piedra on the Kings River the average stage was 4.5 feet, the lowest since 1904 and slightly lower than the February record for that year.

FIGHTING THE BIG FREEZE.[1]

By J. E. ADAMSON, Cooperative Observer, Pomona, Cal.

When one undertakes to tell of the recent frost fight in Pomona, the desire to describe it as one would describe a battle between contending armies on the field is almost irresistible. There is the same tense feeling among the recruits in the fight; as the time of the battle draws near, the heart breaks at failures to hold safely some outpost; the same hard struggles at corners and along roadways. There were the scouts with reports to headquarters of the near approach of the dreaded enemy at some point more weak than others, and the orders to some part of the long front to open fire, then the gradual spread of the firing until before long the red glare extends along the whole line.

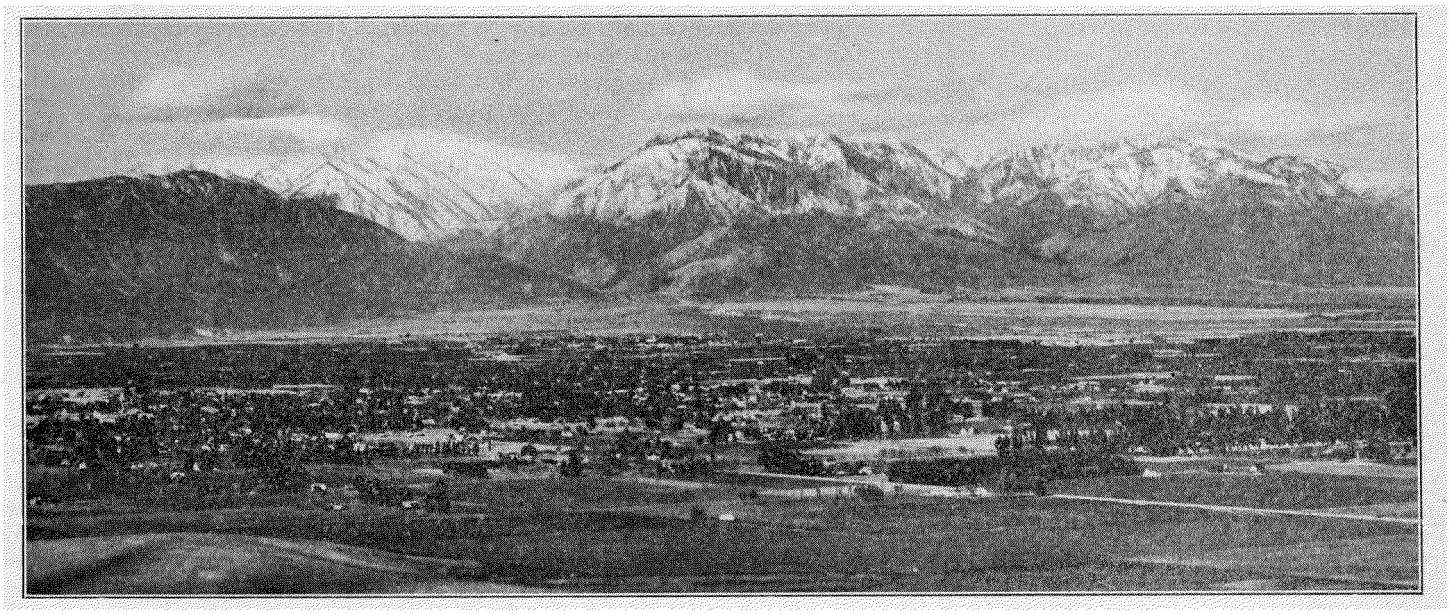
The very preparation for this fight was like a revolt of a downtrodden people. This same enemy had for many years made almost annual visits to the southland and taken toll from the tillers of the soil. Not always in the same place, sometimes only making a slight demand, but always feared.

Small groups here and there for many years offered resistance, but in a way so puny and isolated that it seemed to come to naught. But out of these attempts came a gradual awakening of the people, so that the fight became more and more centralized from year to year, and when the danger time came this past fall there were not a few, but a large body of men, near Pomona, organized for a concerted rebellion, and busy getting in supplies of ammunition in the shape of oil, and guns in the way of various kinds of pots in which to burn the oil, and other equipment such as torches and tank wagons. Headquarters had been established earlier in the year, and a chief of staff appointed; instructions were ready for the ones unfamiliar with the work in hand; nothing was to stand in the way of a winning fight.

In the final results it would be hard to find any one factor which it could be said was the most effective in saving, almost unscathed, thousands of beautiful trees and a large proportion of a bounteous crop of fruit, unless it might be the dominating spirit of perseverance on the part of the fighters, toiling on without rest for four days and nights.

Many and varied were the heaters used, from the more modern type with shore smokestacks and dampers to control and aid combustion, down the line to the cruder kinds of the past, to the use even of empty powder cans with tops cut out. The latter kinds, of course, made, as well as heat, a dense volume of smoke and gave off large quantities of soot. The other well-known forms, the old-style Bolton and the Hamilton reservoir heaters, were in evidence, but by far the greatest number in use were improved Bolton and the California 3-gallon heaters. The latter was the heater made in large quantities for the California Fruit Growers' Exchange. Both these heaters did splendid service, and made much less smoke and soot than the older and more crude forms.

Some of the Griffiths' smudge fuel, a mixture of mill shavings and crude oil, was used, but not to any great extent in this vicinity.



View of Pomona district and its mountain environment.

The lighting was done mostly by the use of a simple device designed by the writer some years ago, and known as the Adamson torch. It is extremely simple and it is not hard to light 250 to 300 heaters per hour, and an active man can do better.

The oil used in the heaters was to be what is termed "slop distillate," and to contain only a small amount of asphaltum. It was soon found that when such large quantities were called for on short notice, it was not to be had in any specified grade, so it turned out that oils of much lower gravity and containing 25 per cent and over of asphaltum were shipped and burned.

The oils, as they average up in price for the different grades used, will cost the grower about $1.10 per barrel of 42 gallons. This includes the purchase price, the freight, the cost of handling, the building of tanks, handling equipment at the railroad tracks, also all the expenses of the temperature patrol service operated for the benefit of the frost fighters.

Many of the growers placed complete equipment of 100 heaters per acre; the average was not above 75 per acre

[1] Reprinted by courtesy of the editor Pacific Rural Free Press, San Francisco, Cal., issue of Mar. 15, 1913.